CONTROLS COMPANY OF AMERICA
CONTROL SWITCH DIVISION
1420 Delmar Drive, Folcroft, Pennsylvania 19032

HERMETIC & ENVIRONMENT-FREE SWITCHES

CATALOG NO. **130**

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HERMETICALLY-SEALED and ENVIRONMENT-FREE SWITCHES

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Availability

All Control Switch Division products are available through a nationwide sales and Distributor organization.

Sealed switches can logically be divided into **two** primary classifications: Hermetically-Sealed, and Environment-Free. Often the precise dividing lines between the characteristics of these two groups differ among manufacturers and users. The switches in this catalog are grouped according to these generally accepted definitions:

Hermetically-Sealed switches are completely sealed against **all** contaminants, atmospheric conditions, and altitude changes. Every unit is inspected with a mass-spectrometer and must have a Leak Rate of less than 1 micron cubic foot per hour at one atmosphere. All Hermetically-Sealed switches are backfilled with a dry, inert gas (usually Nitrogen). See pages 3 to 15.

Environment-Free switches are not backfilled. Various classes of seals are used, according to the environmental conditions in which the switch is designed to function. Usually E F switches are sealed against humidity, fumes, dust, oil, and general contaminants. E F switches are not normally sealed against atmospheric changes, or immersion. See pages 16 and 17.

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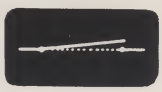
10M, 8/63 G-E

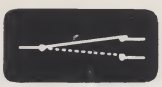
ELECTRICAL TERMS

Single Pole . . . interrupting the current in a single conductor of a circuit.

Multiple Pole . . . interrupting the current in two or more separate conductors simultaneously.

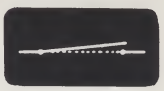


Single Throw . . . moving contact completes a circuit at only one of its extreme positions. May be normally-open or normally-closed.

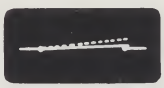


Double Throw . . . moving contact completes a circuit at each of its two extreme positions. Is both normally-open and normally-closed.

Two Circuit . . . double throw switch in which the two circuits are independent of each other. One circuit is always open, the other circuit is always closed.



Normally-Open . . . circuit is open when switch is not being actuated.



Normally-Closed . . . circuit is closed when switch is not being actuated.

Electrical Rating . . . the recommended electrical load that the switch will control under a given set of conditions.

MECHANICAL TERMS

Free Position . . . the unoperated, fully extended position of the actuator.

Pretravel . . . distance or angle the actuator travels from free position to the Operating Position.

Operating Position . . . the position of the actuator when the snap action of all switch contacts occurs during actuation stroke.

Operating Force . . . force or torque applied to the actuator to reach the Operating Position.

Overtravel . . . movement of actuator from Operating Position to final position at end of actuating stroke.

Overtravel Force . . . force or torque applied to actuator to move from Operating Position to full Overtravel Position.

Reset Position . . . position of actuator when all switch contacts return to positions prior to actuation.

Movement Differential . . . distance or angle the actuator travels in returning from Operating Position to Reset Position.

Release Force . . . the amount of external force or torque the switch will overcome when returning from Overtravel Position to Free Position.

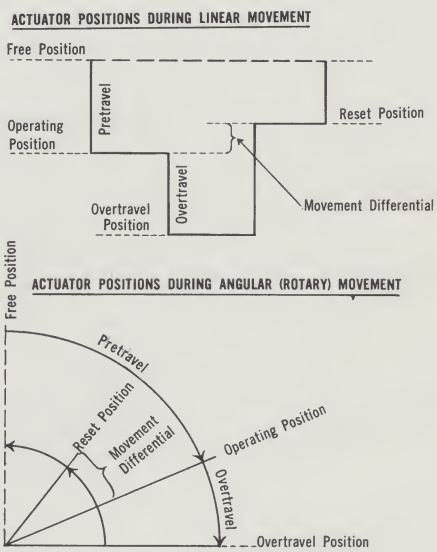
Total Travel . . . sum of pretravel and overtravel.

Snap Action . . . a rapid motion of the contacts from one position to another. Snap Action is independent of rate of travel of actuator.

Contact Pressure . . . at any point, the amount of force holding stationary and movable contacts together.

Contact Gap . . . the effective open distance between the movable and stationary contacts.

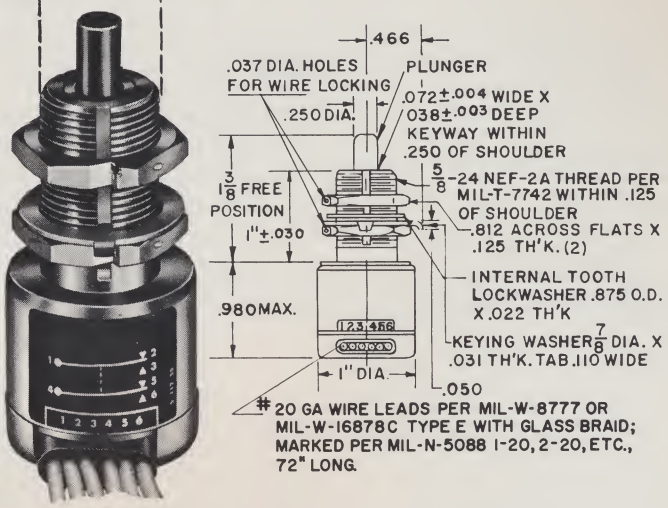
Multiple Break . . . an arrangement of contacts such that the circuit is broken simultaneously in several places.



TWO S.P.D.T.

H11-SERIES / rugged HERMETICALLY-SEALED SWITCHES

feature one-hole panel mounting



Model H11-2
Conforms to MS-24331-1

The H11-series of hermetic switches consists of hundreds of variations of this basic MS Spec. model. They may be used for any exposed control or indicating application subject to severe environmental conditions.

Heliarc welding is used for positive sealing and added strength. The header is brazed, not just welded. All exposed parts are Stainless Steel or Monel, or are treated for corrosion resistance.

All models are hermetically-sealed, backfilled with dry, inert gas, and tested to insure a leak rate of less than 1 micron cubic foot per hour (1 atmosphere pressure differential).

H11-2 meets all requirements of Immersion Test MIL-E-5272, Procedure I.

These light but rugged switches mount **anywhere** — through a single mounting hole. They are infinitely adjustable by use of lock nuts. High operating and overtravel forces are available in any model to provide positive ice-breaking operation.

Operating Characteristics* . . .

Contact Arrangement	2—S.P.D.T.
Pretravel	.040 Max.
Movement Differential	.020 Max.
Overtravel	.250 Min.
Operating Cycles	25,000 Min.
Break Distance	.010 Min.
Difference of Operating & Reset Pt. Between Each Pole	.010 Max.
Operating Force	9± 3 Lbs.
Overtravel Force	30 Lbs. Max.
Release Force	4 Lbs. Min.
Electrical Rating — Sea Level to 100,000 Ft.	28 VDC, 4A Res. 2 A. Ind. — 4A Motor
Lamp Load @ 28 VDC	2.4 Amps.
Ambient Temperature Range	—100° to +221° F.
Weight	.46 Lb. Max.

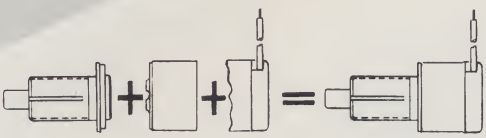
* Other characteristics available on request. Please specify.

SEE VARIATIONS OF THIS BASIC SWITCH

The features and characteristics given above are basic to the entire line of 2-pole H11-series switches. However, any conceivable variation can be produced to meet your specific application. If Model H11-2 (above) will meet your requirements, it is available immediately from stock.

. . . But if the Model H11-2 does not meet your exact application requirements for a One-Hole Mounted Hermetically-Sealed Switch . . .

You can DESIGN a switch to fit your own NEEDS



Control Switch Division Hermetically-Sealed H11-series switches are built on a modular design. Thus you can select the individual actuator, the termination, the housing, and operating characteristics that best suit your needs. Put them all together and you have your own switch design . . . and we can produce it for you immediately.

On the next pages you will find the modular components for the complete H11-series, including single, double, triple, and 4-pole models. All these components are engineered and tooled for immediate production. This gives you the unique advantage of custom-designed units, without the delays of engineering and tooling.

Of course, if your application is so unique that you require a design modification not shown on these pages, we can provide prompt design and engineering service. Just select the components most nearly meeting your requirements; then tell us what further modifications you wish. We will quickly provide you with drawings and details. . . and save you time and money.

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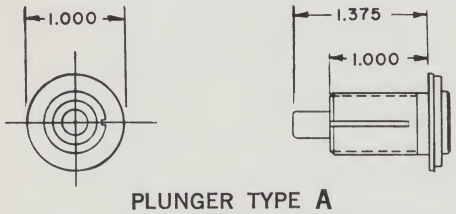
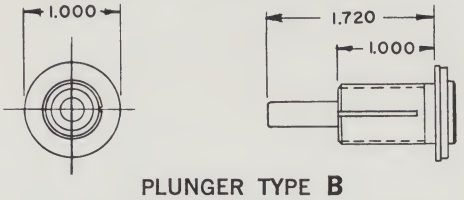
actuators You may select from
tors, and three rotary actuators. Three types of rotary
two of which may be ordered in various lengths.

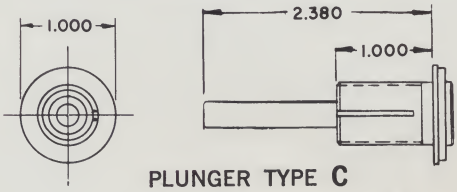
plungers



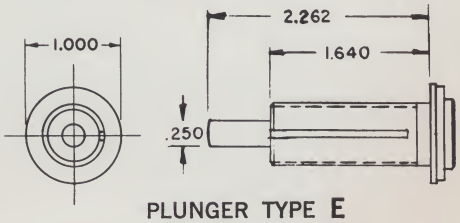
PLUNGER TYPE **A**



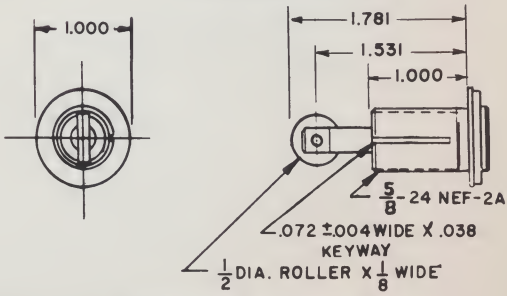
PLUNGER TYPE **B**



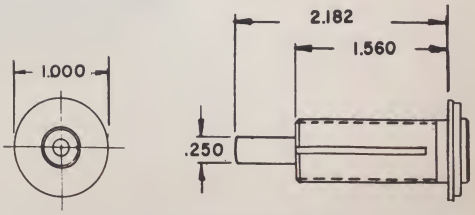
PLUNGER TYPE **C**



PLUNGER TYPE **E**



ROLLER PLUNGER TYPE **F**



PLUNGER TYPE **S**

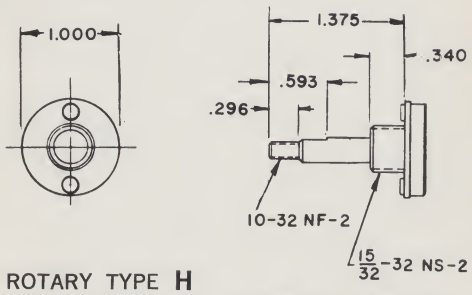
Special Switch: 2 pole, 4 circuit for 15 amp. resistive load. Available only as shown above. Housing is 1.700" long (with Type 1 termination). Select from terminations shown for 2-pole switches. Conforms to MS-24331-4.

ix types of plunger actua-
ctuator arms are available,

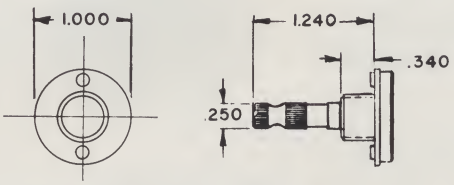
You will note that all H11-series D.P.D.T. switches utilize a case with a diameter of one inch. Thus all actuators come with a standard one-inch bushing which is heliarc welded to the case.

or rotary...

ROTARY TYPE **G**
without spring return. (Conforms to MS-24420). Spring Return available as TYPE GS (GS can be used only with large housings TYPE XX).

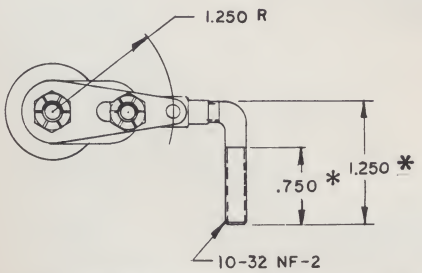


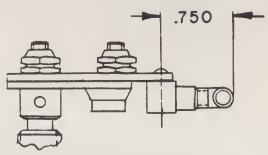
ROTARY TYPE **H**
without spring return. Spring Return available as TYPE HS (HS can be used only with large housing TYPE XX).



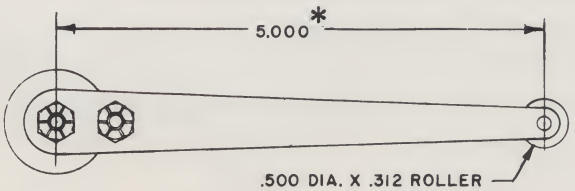
ROTARY TYPE **J**
without spring return. Spring Return available as TYPE JS. (JS can be used only with large housings TYPE XX).

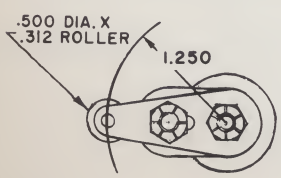
with any of these rotary arms

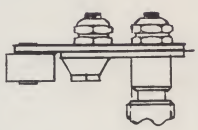




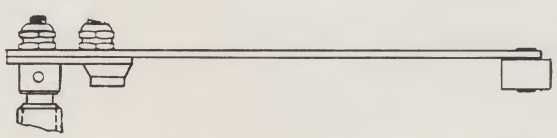
ADJUSTABLE SHAFT ARM TYPE **K**
* Specify both length of shaft beyond bend, and length of hole in shaft end.
NOTE: TYPE K can **not** be used with Spring Return actuators.







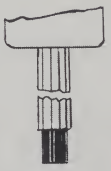
ADJUSTABLE ROLLER ARM TYPE **L**



LONG ADJUSTABLE ROLLER ARM TYPE **M**
* Specify length desired, from 5" to 6½".

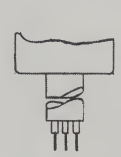
termination Below are shown the four basic types of termination: wire leads, wire leads within cable shield and cover, standard size connector, and Pigmy type connector. Each termination method may be applied to either the side or the bottom end of the switch.

SIDE WIRE LEADS TYPE **1**
per MIL-W-16878C, Type E with glass braid, or MIL-W-8777 No. 20 ga

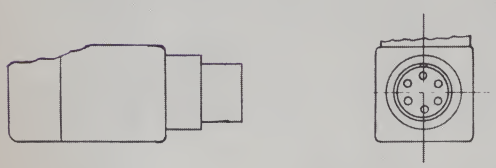


END WIRE LEADS TYPE **2**
per MIL-W-16878C, Type E with glass braid, or MIL-W-8777 No. 20 ga

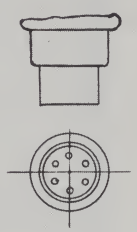
SIDE CABLE TYPE **3**
cable shield and cover per MIL-C-915



END CABLE TYPE **4**
cable shield and cover per MIL-C-915

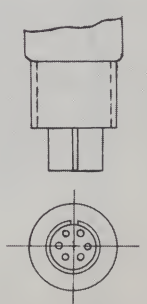


SIDE CONNECTOR RECEPTACLE TYPE **5**
specify brand (Bendix, Deutsch, etc.)



END CONNECTOR RECEPTACLE TYPE **6**
specify brand (Bendix, Deutsch, etc.)

SIDE PIGMY CONNECTOR TYPE **7**
Bendix PT1H-10-6P receptacle

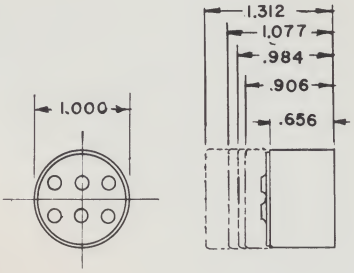


END PIGMY CONNECTOR TYPE **8**
Bendix PT1-H-10-6P receptacle

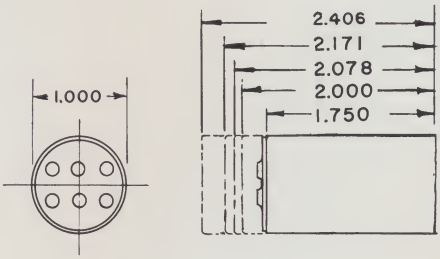
housing

All housings for D.P.D.T. units in the H11-series are one inch in diameter. However they come in two basic groups of case lengths: short (TYPE X for all D.P.D.T. units except Spring Return Rotaries), and long case (TYPE XX for use **only** with Spring Return Rotary Actuators).

Five dimension lengths are available in each group.



SHORT HOUSING TYPE **X**
available in 5 lengths shown. (Can not be used with Spring Return Rotary Actuators.)



LONG HOUSING TYPE **XX**
available in 5 lengths shown. (Only this housing can be used with Spring Return Rotary Actuators.)

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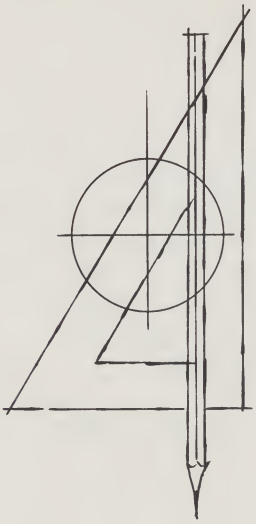

How to ORDER your own DESIGN

To design the composite switch you need, first select the Actuator Type, and note its Type Number. (Example: If you select Rotary Type H with spring return, and a 5.75-inch long Adjustable Roller Arm Type M . . . write HSM5.75-)

Next, select your termination . . .

If you desire a termination method not shown (such as conduit fitting, etc.) specify that method instead of using the Termination Type Numbers below.

When you have selected your termination method, note its Type Number after the notation of your selected Actuator. (Example: to the previously selected actuator example, you wish to add Side Wire Leads . . . add TYPE 1 to the actuator number, thus: HSM5.75-1-)

Now select your housing . . .

Select your housing size and add both its TYPE and actual length dimension to the end of your composite switch part number. (Example: for the previously selected Spring Return rotary actuator and termination, you must use a Long Housing (XX). Select your actual dimension from the "XX" group, for example, 2.078 inches. The completed switch part number now becomes HSM5.75-1-XX2.078)

Now check the basic Operating Characteristics given on Page 3 and determine whether you require any variances. If you do, note them along with the composite switch part number you have just created.

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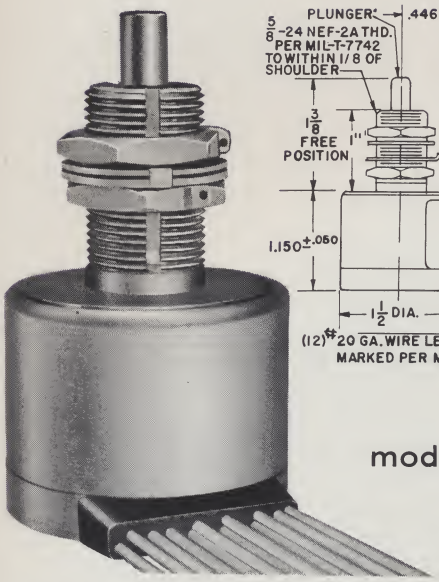
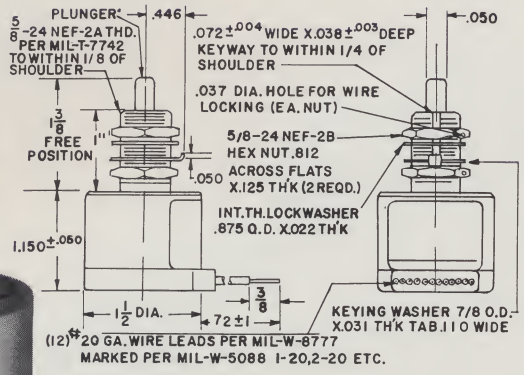
HERMETICALLY-SEALED one-hole mounting

FOUR S.P.D.T.





model H11-130

OPERATING CHARACTERISTICS

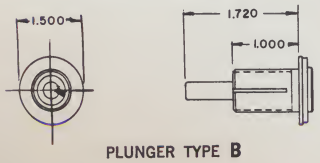
Operating force	10 ± 3 lbs. max.
Overtravel force	30 lbs. max.
Release force	6 lbs. min.
Pretravel	.040 max.
Movement differential	.030 max.
Overtravel	.250 min.
Operating cycles	25,000 min.
Weight	.9 lb. max.
Ambient temperature range	−65° to +221°F.
Electric rating:	
28 VDC Lamp	2.4 amps
28 VDC Res.	5 amps
28 VDC Ind.	2.5 amps
28 VDC Motor	4 amps
Inrush	24 amps

actuators You may select from six types of plunger actuators, and three rotary actuators. Three types of rotary actuator arms are available, two of which may be ordered in various lengths.

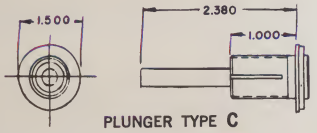
You will note that all H11-series 4 P.D.T. switches utilize a case with a diameter of 1½ inch. Thus all actuators come with a standard 1½ inch bushing which is heliarc welded to the case.

plungers

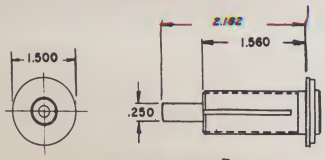
PLUNGER TYPE **A**



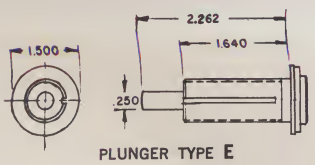
PLUNGER TYPE **B**



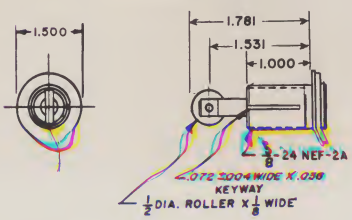
PLUNGER TYPE **C**



PLUNGER TYPE **D**

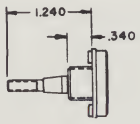


PLUNGER TYPE **E**

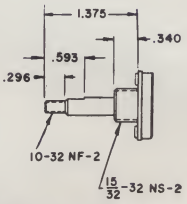


ROLLER PLUNGER TYPE **F**

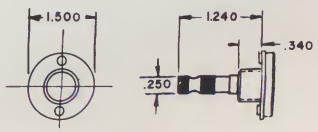
or rotary...



ROTARY TYPE **G**
without spring return. (Conforms to MS-24420). Spring Return available as TYPE GS (GS can be used only with large housings TYPE ZZ).

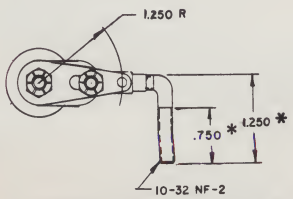


ROTARY TYPE **H**
without spring return. Spring Return available at TYPE HS (HS can be used only with large housing TYPE ZZ).

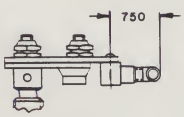


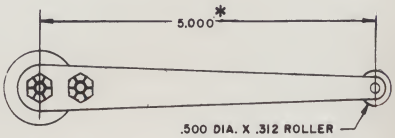
ROTARY TYPE **J**
without spring return. Spring Return available as TYPE JS. (JS can be used only with large housing TYPE ZZ).

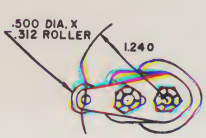
with any of these rotary arms



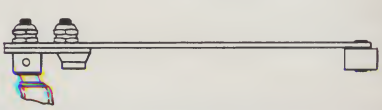
ADJUSTABLE SHAFT ARM TYPE **K**
* Specify both length of shaft beyond bend, and length of hole in shaft end.
NOTE: TYPE K can not be used with Spring Return actuators.







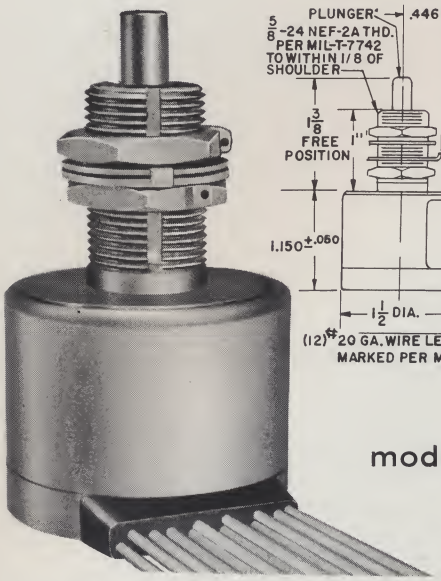
ADJUSTABLE ROLLER ARM TYPE **L**

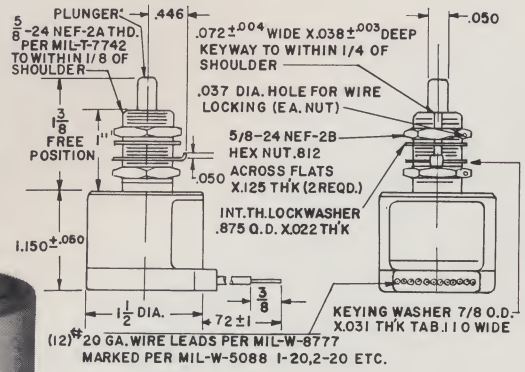


LONG ADJUSTABLE ROLLER ARM TYPE **M**
* Specify length desired, from 5" to 6½".

HERMETICALLY-SEALED one-hole mounting

FOUR S.P.D.T.





model H11-130

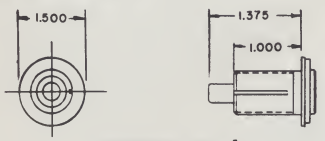
OPERATING CHARACTERISTICS

Operating force	10 ± 3 lbs. max.
Overtravel force	30 lbs. max.
Release force	6 lbs. min.
Pretravel	.040 max.
Movement differential	.030 max.
Overtravel	.250 min.
Operating cycles	25,000 min.
Weight	.9 lb. max.
Ambient temperature range	−65° to +221°F.
Electric rating:	
28 VDC Lamp	2.4 amps
28 VDC Res.	5 amps
28 VDC Ind.	2.5 amps
28 VDC Motor	4 amps
Inrush	24 amps

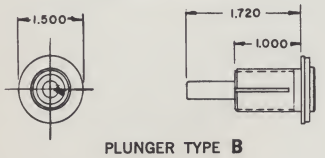
actuators You may select from six types of plunger actuators, and three rotary actuators. Three types of rotary actuator arms are available, two of which may be ordered in various lengths.

You will note that all H11-series 4 P.D.T. switches utilize a case with a diameter of 1½ inch. Thus all actuators come with a standard 1½ inch bushing which is heliarc welded to the case.

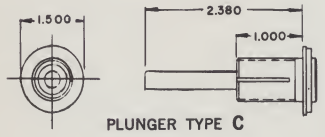
plungers



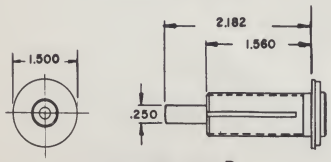
PLUNGER TYPE **A**



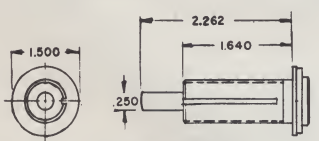
PLUNGER TYPE **B**



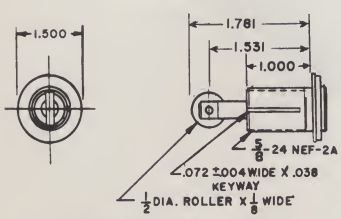
PLUNGER TYPE **C**



PLUNGER TYPE **D**



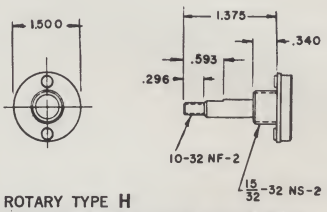
PLUNGER TYPE **E**



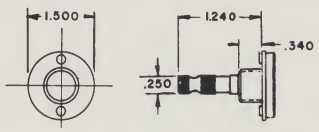
ROLLER PLUNGER TYPE **F**

or rotary...

ROTARY TYPE **G**
without spring return. (Conforms to MS-24420). Spring Return available as TYPE GS (GS can be used only with large housings TYPE ZZ).

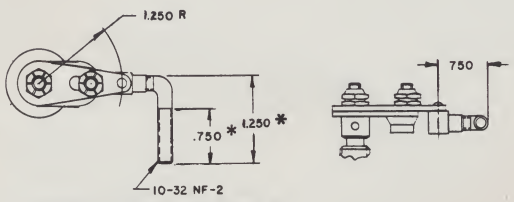


ROTARY TYPE **H**
without spring return. Spring Return available at TYPE HS (HS can be used only with large housing TYPE ZZ).



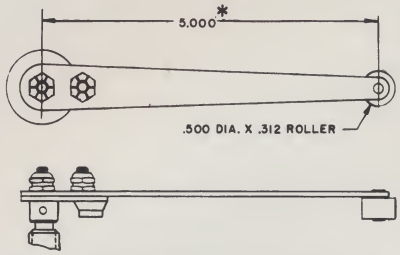
ROTARY TYPE **J**
without spring return. Spring Return available as TYPE JS. (JS can be used only with large housing TYPE ZZ).

with any of these rotary arms



ADJUSTABLE SHAFT ARM TYPE **K**
* Specify both length of shaft beyond bend, and length of hole in shaft end.
NOTE: TYPE K can not be used with Spring Return actuators.

ADJUSTABLE ROLLER ARM TYPE **L**



LONG ADJUSTABLE ROLLER ARM TYPE **M**
* Specify length desired, from 5" to 6½".

Four separate circuits can be switched simultaneously with Model H11-130 or any of its many variations. These are true hermetics... sealed and backfilled with Nitrogen.

H11-130 has a brazed header, heliarc welded case, and an "O" ring seal at the plunger. The unit will pass immersion tests for MIL-E-5272—Procedure I. Plunger has a built-in ice scraper for dependable operation under mud or ice conditions. All exposed parts are corrosion-resistant.

The operating characteristics given for Model H11-130 are basic for the entire four-pole series. However, models are available with many variations. Examples: Ambient Temperature ranges of −40° to +160°F or −100° to +221°F; low operating force of 3 to 6 lbs., etc.

All units in this group are designed for simplified one-hole mounting.

VARIATIONS IN BASIC 4-P.D.T.

Shown below are the various standard component parts which can be combined in any way to make a 4-pole, D.T. switch to exactly meet your requirements.

*You will note that these components are exactly the same as the components offered for the Model H11-2 and its D.P.D.T. variations. The only difference is in dimensions of the 4-pole case: diameter is 1½" on all 4-pole models (but only 1" diameter on the 2-pole models), and case lengths differ.

To order, follow the instructions given on Page 7½ (narrow flap). When you reach the point of selecting your housing, use the Housing Type Number "Z" or "ZZ" and dimensions given on this page only. (Note that Housing Type ZZ must be used with any Spring Return Rotary Actuator.)

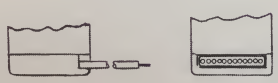
***Example:** here is the correct part number for a 4-pole switch* with a Spring Return Rotary Actuator with a 5.75-inch long Adjustable Roller Arm (HSM5.75), with Side Wire Leads (-1-), and a long 2.015-inch Housing (ZZ2.015).

Part Number HSM5.75-1-ZZ2.015

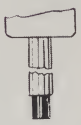
Now check the basic Operating Characteristics given for Model H11-130 and determine whether you require any variances. If you do, note them along with the composite switch part number you have just created.

termination

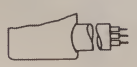
Below are shown the four basic types of termination: wire leads, wire leads within cable shield and cover, standard size connector, and Pigmy type connector. Each termination method may be applied to either the side or the bottom end of the switch.



SIDE WIRE LEADS TYPE **1**
per MIL-W-16878C, Type E with glass braid, or MIL-W-8777 No. 20 ga

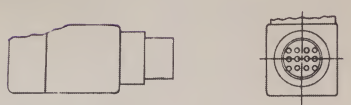


END WIRE LEADS TYPE **2**
per MIL-W-16878C, Type E with glass braid, or MIL-W-8777 No. 20 ga

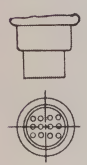


SIDE CABLE TYPE **3**
cable shield and cover per MIL-C-915

END CABLE TYPE **4**
cable shield and cover per MIL-C-915

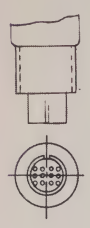


SIDE CONNECTOR RECEPTACLE TYPE **5**
specify brand (Bendix, Deutsch, etc.)



END CONNECTOR RECEPTACLE TYPE **6**
specify brand (Bendix, Deutsch, etc.)

SIDE PIGMY CONNECTOR TYPE **7**

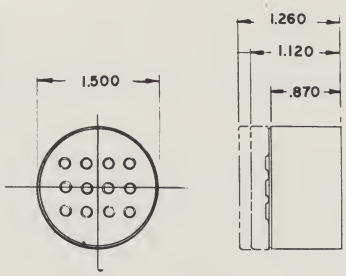


END PIGMY CONNECTOR TYPE **8**

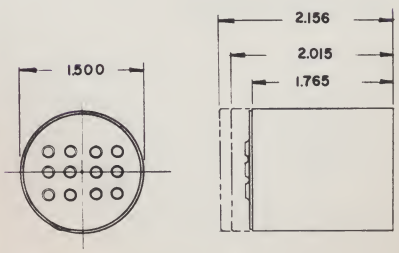
housing*

All housings for 4 P.D.T. units in the H11-series are 1.5 inch in diameter. However they come in two basic groups of case lengths: short (TYPE Z for all D.P.D.T. units except Spring Return Rotaries), and long case (TYPE ZZ for use **only** with Spring Return Rotary Actuators).

Three dimension lengths are available in each group.



SHORT HOUSING TYPE **Z**
available in 3 lengths shown. (Can not be used with Spring Return Rotary Actuators.)



LONG HOUSING TYPE **ZZ**
available in 3 lengths shown. (Only this housing can be used with Spring Return Rotary Actuators.)

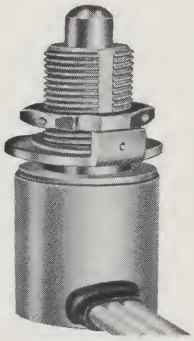
model H11-20

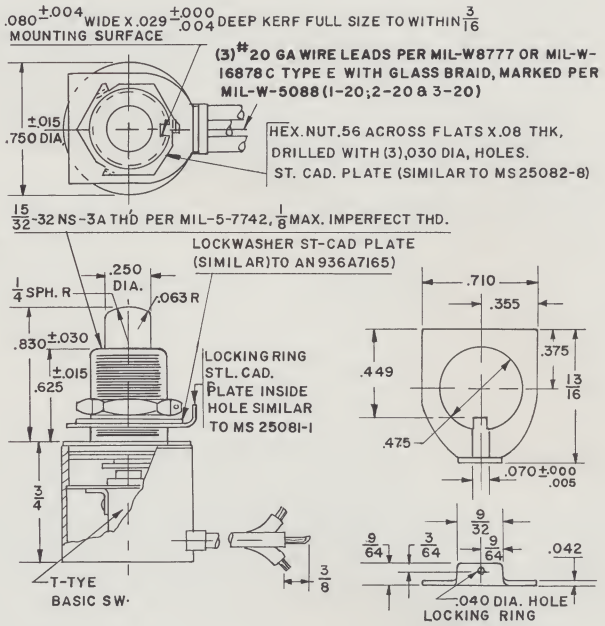
Here is a new version of the Model H11-2, basic MS-24331 standard switch. Design and construction is very similar to the H11-2 except that the H11-20 is about 40% smaller, and is a single-pole instead of a double-pole switch.

This unit's plunger is sealed with an "O" ring, and all leads are anchored and sealed in epoxy. Passes military immersion test MIL-E-5272—procedure I, even though unit is not backfilled with Nitrogen.

Conforms to MIL-S-6744 and is designed to meet electrical capacity tests in atmospheres of 100,000 feet at −65°F, and pass MIL-E-5272 vibration tests.

Other features: corrosion-resistant external parts . . . silver brazed case . . . simplified one-hole mounting . . . high operating and overtravel force . . . built-in ice scraper.





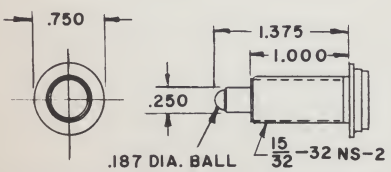
OPERATING CHARACTERISTICS

Operating Force	8½ ± 3 Lbs.
Overtravel Force	20 Lbs. Max.
Diff. Travel	.008 Max.
Pre-Travel	.040 in. Max.
Overtravel	.125 in. Min.
Weight	.30 Lbs. Max. with Leads
Ambient Temperature Range	−65° to +250°F.
Electrical Rating:	28 VDC, 6 Amps. Res. 2.5 Amps. Ind.

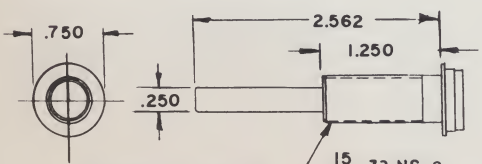
variations In basic S.P.D.T.

Shown below are the various standard component parts which can be combined in any way to make a S.P.D.T. switch exactly meeting your requirements. Select the components you want, then order by specifying the component Type Numbers in this order: Actuator-Termination-Housing. (Example: N-9-WW) Operating characteristics as given for Model H11-20 above are standard. Any other variations of characteristics or conformation can be custom-made on request.

ACTUATORS

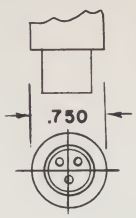


PLUNGER WITH ROLLER BALL TYPE **N**

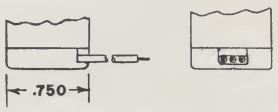


PLUNGER TYPE **P**

TERMINATIONS

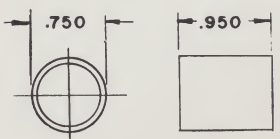


END CONNECTOR TYPE **9**

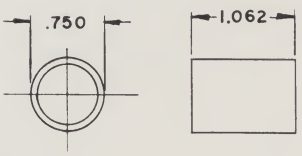


SIDE WIRE LEADS TYPE **10**

HOUSINGS



.950" HOUSING TYPE **W**



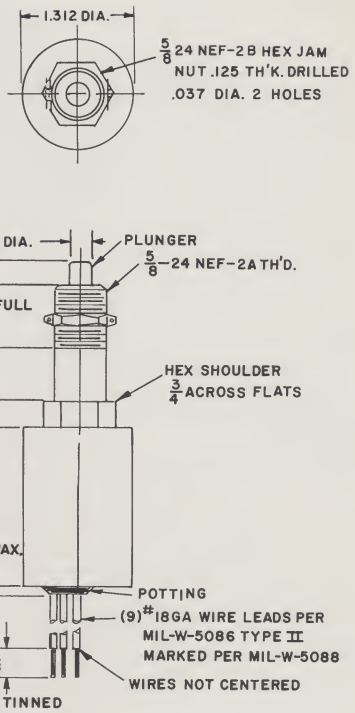
1.062" HOUSING TYPE **WW**

HERMETICALLY-SEALED one-hole mounting T.P.D.T.

model H11-24

The basic switch for the simultaneous switching of three separate circuits. The plunger is sealed with an "O" ring. Leads are potted, header is brazed. Unit is epoxy-sealed and has been qualified under the military immersion test MIL-E-5272-Procedure I even though it is not backfilled.

Corrosion-resistant—Bushing is monel, push-button plunger is stainless steel, body is cold rolled steel finished per MIL-P-6889. This finish will withstand 100-hour salt spray tests outlined under MIL-S-6744. One-hole mounting—Permits vernier adjustment of the operating point over 5/8-in. range. Simplifies mounting. High operating and overtravel force — Assures positive, dependable operation with ice or dirt on plunger. Ice scraper built into bushing.



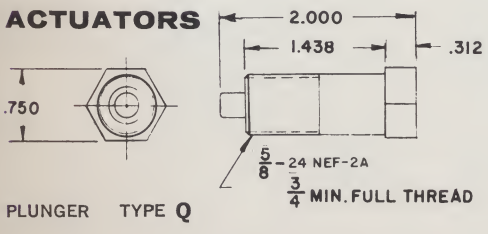
OPERATING CHARACTERISTICS

Operating force	6 ± 1½ lbs.
Overtravel force	14 lbs. max.
Mov. differential	.030 ± .010-in.
Pretravel	.060-in. max.
Weight	9 oz. max.
Ambient temperature range	−65° to +221°F.
Electrical rating: (K3 basic sw. in housing)	
120 VAC/30 VDC resistive	15 amps.
30 VDC inductive	10 amps.

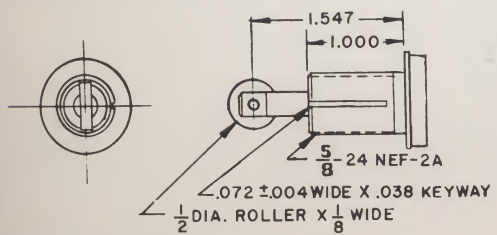
variations In basic T.P.D.T.

Shown below are the various standard component parts which can be combined in any way to make a T.P.D.T. switch exactly meeting your requirements. Select the components you want, then order by specifying the component Type Numbers in this order: Actuator-Termination-Housing. (Example: Q-11-Y) Operating characteristics as given for Model H11-24 above are standard. Any other variations of characteristics or conformation can be custom-made on request.

ACTUATORS

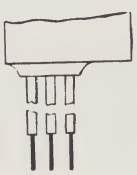


PLUNGER TYPE **Q**

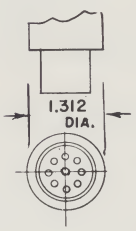


PLUNGER WITH ROLLER TYPE **R**

TERMINATIONS

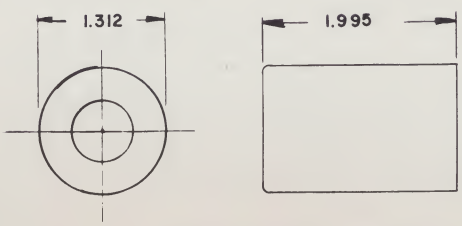


END WIRE LEADS TYPE **11**



END CONNECTOR TYPE **12**

HOUSINGS



1.995" HOUSING TYPE **Y**

HERMETICALLY-SEALED three tube mount
or backing plate mount

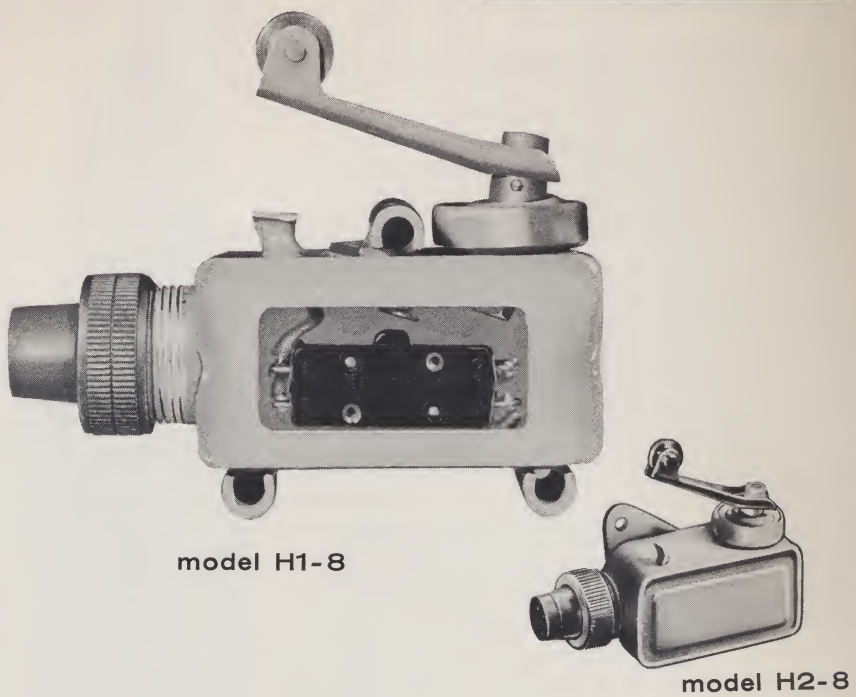
S.P.D.T./D.P.D.T.
4 circuit

model H1-8

Here are rugged sealed switches for industrial or military applications. The models H1-8 and H2-8 shown here are typical of the series. The sealed case can contain a single basic switch to provide S.P.D.T. switching, or a pair of basic switches for D.P.D.T. with simultaneous break for the advantages of four separate circuits. The housing is a rugged unit, copper brazed at all joints, with cover solder-sealed. Electrical leads imbedded in a glass-to-metal header provide a positive, leak-proof seal to the connector. The unit is backfilled with Nitrogen.

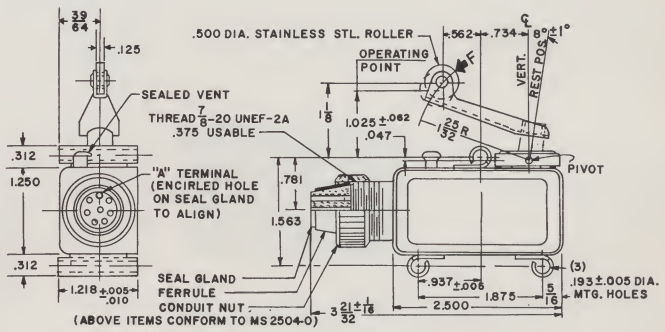
Two basic mounting methods are available: three tubes (H1-series), or backing plate (H2-series). Each are attached with No. 10 screws or bolts. Backing plate method is available in either left- or right-hand configuration. Other special mounting methods can be designed to fit your needs.

The integrally-mounted actuator has a diaphragm-type actuator seal of silicon rubber which remains flexible to —100°F, and a layer of teflon bonded in place and also held by mechanical seal retainer. The combination of a sturdy steel pivot on the actuator and the tipping motion of the diaphragm frees the switch of ice accumulation. Roller lever actuator shown is standard. Actuator levers can be designed for your specific application.



model H1-8

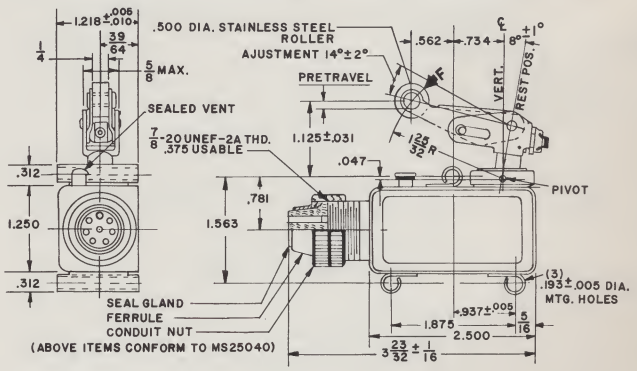
model H2-8



OPERATING CHARACTERISTICS

Pretravel	.100 ± .031
Movement Differential	.062 +.025 —.000
Overtravel	.281 min.
Operating Force	4 lbs. +2 —0
Overtravel Force	11 lbs. ± 3
Dielectric Strength	1,000 V.R.M.S. min.
Ambient Temperature Range	—100°F to +250°F
Min. Mechanical Cycles	200,000
Min. Electrical Cycles	200,000
Electrical Rating	125/250 V. A.C. 10 amps. 28 V. D.C. 15 Amps. Resistive 28 V. D.C. 10 Amps Inductive
Difference of Operating and Reset Points between Each Pole	.010" max.
Weight	7 oz. max.

H1-1 S.P.N.C.	H1-5 D.P.N.C.
H1-2 S.P.N.O.	H1-6 D.P.N.O.
H1-3 S.P.D.T.	H1-7 D.P.D.T.
H1-4 S.P.D.T.—2 circuits	H1-8 D.P.D.T.—4 circuits



model H1-43

This version of the H1-series sealed switch features infinite actuator adjustment to meet changing application requirements. It also provides greater control accuracy. Roller adjusts through 14° ± 2° at infinite settings.

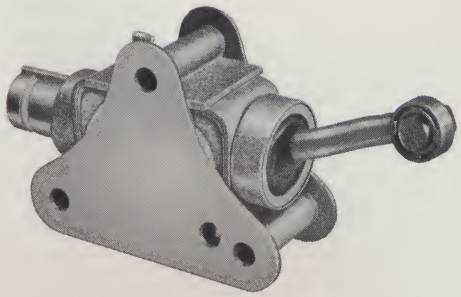
HERMETICALLY-SEALED S.P.D.T. / D.P.D.T.

These are miniaturized, extremely rugged switches to fit in unusually compacted areas. Both are actuated by an anti-friction ball-bearing roller arm. Each unit is sealed with a molded silicon rubber diaphram. Switch details and assembly conform to MIL-S-6743 and MIL-S-6744. Both meet requirements of MIL-E-5272A, paragraph 4.5.5 with a time of 6 hours. They are hermetically-sealed and backfilled with an inert dry gas, and tested to a leak rate of less than 1 micron cubic foot per hour.

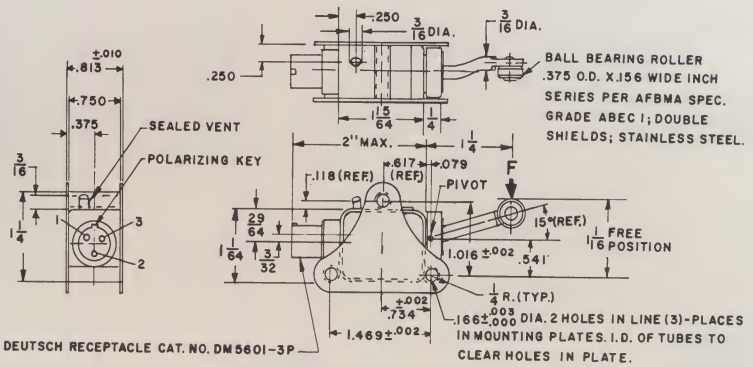
All metal parts are treated for corrosion resistance. Conducting finish desired at least on all mounting contact areas. When mounted on a conducting material, the resistance between any exposed part of the switch assembly and mounting material shall not exceed .1 ohm.

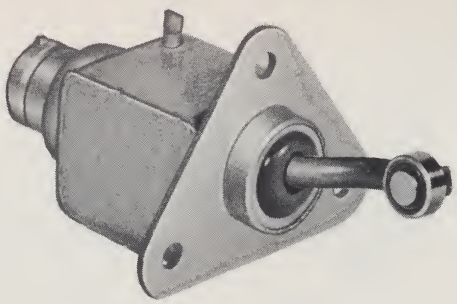
Both units have a high operating force and high spring returned reset force with excellent ice-breaking capabilities.

H6-89 is especially designed to mount in ducting or any location where the actuator feeds through a hole. The mounting plate acts as a seal for the hole. This switch is used on aircraft landing gear where it takes violent shock, yet is able to adapt to gear flexing.

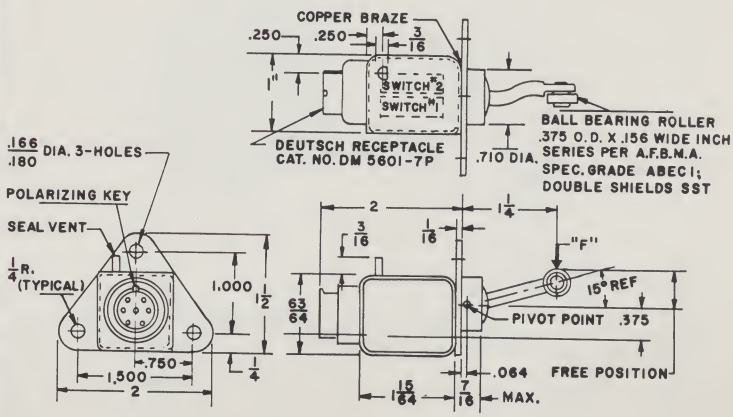


Model H6-89





Model H6-90



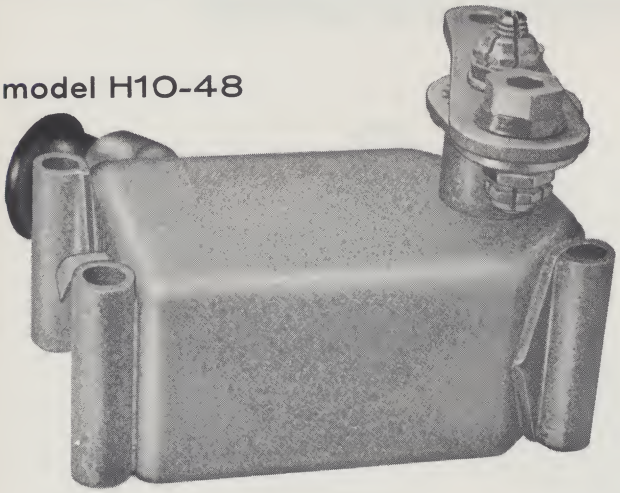
OPERATING CHARACTERISTICS

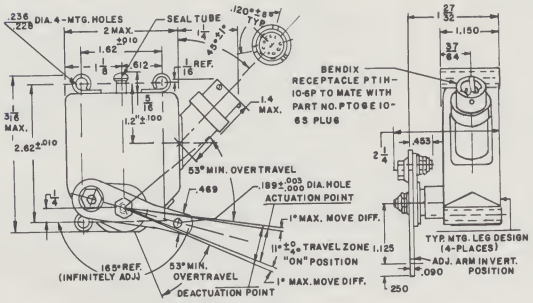
	H6-89	H6-90
Contact Arrangement	S.P.D.T.	D.P.D.T.
Pretravel	.028 ± .012	.063 max.
Movement Differential	.007 max.	.031 max.
Overtravel	.375 min.	.375 min.
Min. Mechanical & Electrical Cycles	50,000	50,000
Operating Force	1¾ ± ¾ lbs.	1¾ ± ¾ lb.
Overtravel Force	7½ lbs. max.	5 lbs. max.
Electrical Rating		
115 VAC, inductive	3 amps	3 amps
30 VDC, inductive	2.5 amps	2.5 amps
Dielectric Strength	750 V.R.M.S.	750 V.R.M.S.
Ambient Temperature Range	—65° to +250°F.	—65° to +250°F.
Weight	2 oz. approx.	3 oz. approx.

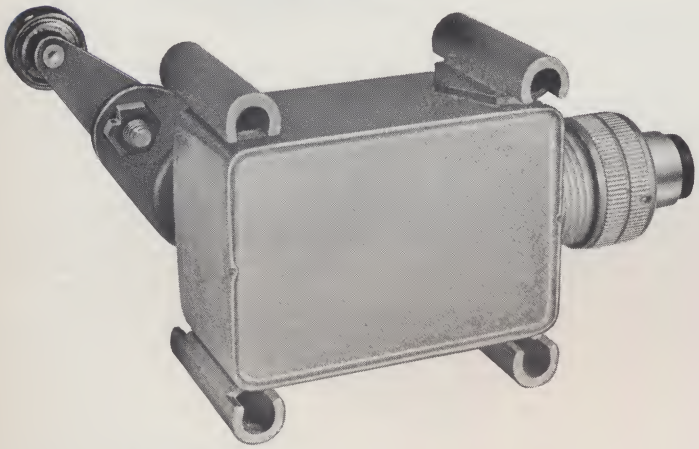
HERMETICALLY-SEALED rotary-actuated

D.P.D.T.

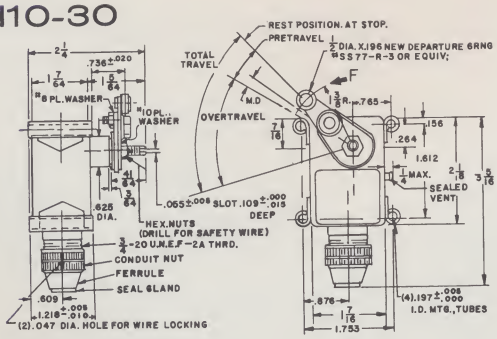
model H10-48







model H10-30



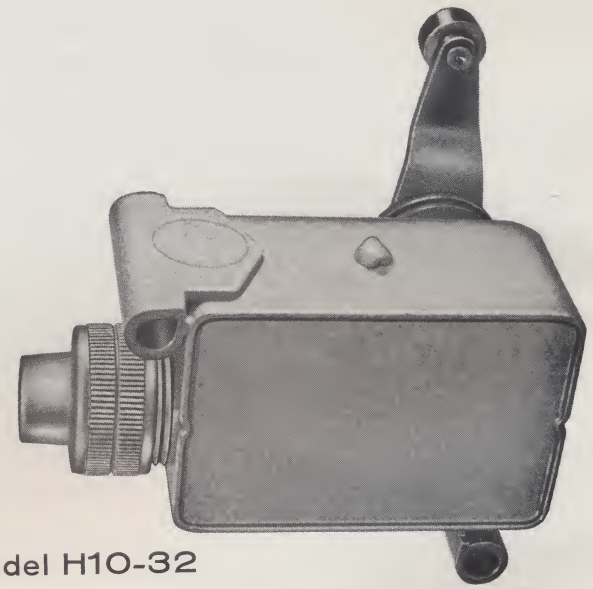
The three rotary switches shown here all have soldered housings and brazed construction similar to M.S. 25040. Instead of an O-ring, the termination is sealed with an elastomer bond. The switch units have 10 amp rating, with Mil. approved simultaneous action.

Any of these units may be supplied with internal reset springs with ice-breaking capabilities.

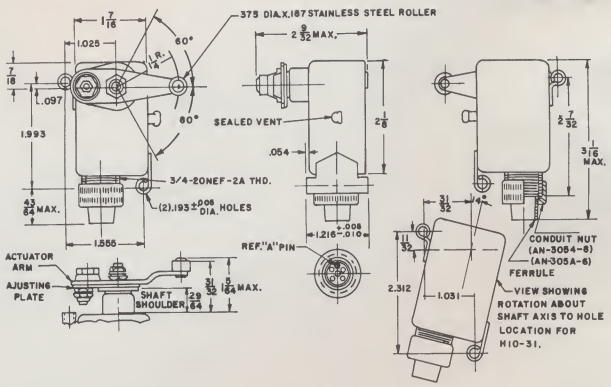
Model H10-48 operates in a clockwise and counter-clockwise direction.

Model H10-30 operates in a counter-clockwise direction only.

Model H10-32 operates in both clockwise and counter-clockwise directions. This model is used as a standard replacement on military & civilian aircraft landing gear.



model H10-32



OPERATING CHARACTERISTICS

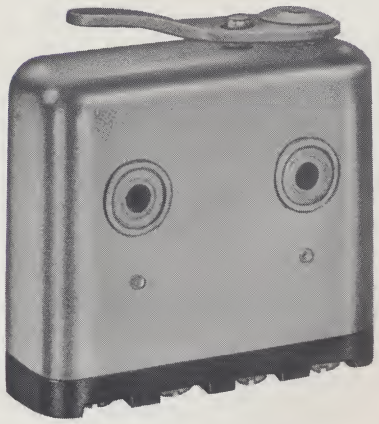
	Model H10-48	Model H10-30	Model H10-32
Pretravel	(see drawing)	15° +0° −4°	30° max.
Movement Differential	1° max.	5° max.	10° max.
Overtravel		30° min.	30° min.
Total Travel	121° min.		
Min. Operating Cycles	100,000	25,000	25,000
Min. Electrical Cycles	100,000	25,000	25,000
Operating Torque	(force:) 6 to 48 ounce-inches	9 inch-lbs. approx.	6 inch-lbs. max.
Overtravel Torque	(force:) 10 inch-lbs. max.	16 ±5 inch-lbs. @30°	6 inch-lbs. max.

	Model H10-48	Model H10-30	Model H10-32
Difference of Operating & Reset Point between each Pole	none	0° 30′ max.	0° 30′ max.
Dielectric Strength	1000V R.M.S. min. @ 60 cy.	1000V R.M.S. min. @ 60 cy.	1000V R.M.S. min. @ 60 cy.
Ambient Temp. Range	−40°F to +160°F	−65°F to +250°F	−65°F to +250°F
Weight	9.6 oz. approx.	7 oz. approx.	7 oz. approx.
Electrical Rating	28 VDC Res. 4 amp. 28 VDC Ind. 2 amp. 28 VDC Lamp 2.4 amp. 28 VDC Motor 4 amp	125/250 VAC 10 amp. 28 VDC Ind. 10 amp. 28 VDC Res. 15 amp.	

HERMETICALLY-SEALED

with 8 separate contacts and terminals

D.P.D.T.
FOUR CIRCUITS



model J2-4

This unusually compact switch combines the advantages of hermetic sealing with near simultaneous double-pole switching. Eight terminals permit operating four circuits with one snap.

Switch mechanism is completely sealed in a dry, inert gas for dependable operation anywhere — at any altitude; any temperature between —100°F. and +250°F. and in any humidity condition. Temperature cycling can't condense moisture inside switch case. Corrosive fumes, dirt and foreign matter are completely sealed out.

The J2-4 model is recommended for use where sealed contacts are required but where means of actuation is protected. Equipped with the actuator A3-17, it is interchangeable with the mounting of AN type toggle switches.

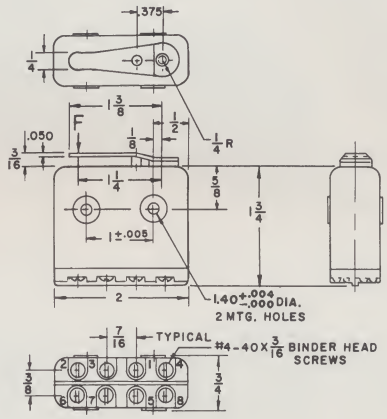
This switch can be wired externally to give the following circuit arrangements: DPDT — 2 circuits; DPST — N.O.; and DPST — N.C.

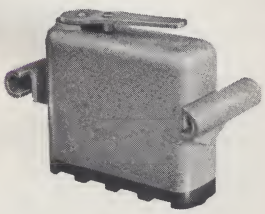
Other Variations Shown here are only a few of the many variations available in the J2 series of hermetic switches. Actuators, mounting means, or operating characteristics can be modified or re-designed to exactly meet your own application requirements.

OPERATING CHARACTERISTICS

Contact Arrangement	Double-Pole Double-Throw 4 CKT.
Pretravel	.093" max.
Movement Differential	.030"
Overtravel	040" min.
Min. Mechanical Cycles	500,000*
Min. Electrical Cycles	100,000
Operating Force	2 +½ —1 lbs.
Electrical Rating	15 amp Res. & Ind. @ 120 VAC .5 amp Res. & Ind. @ 120 VDC 15 amp Res. & Ind. @ 30 VDC
Dielectric Strength	1000 VRMS Min.
Ambient Temperature Range	—100°F. to +250°F.**
Weight	2½ oz. approx.

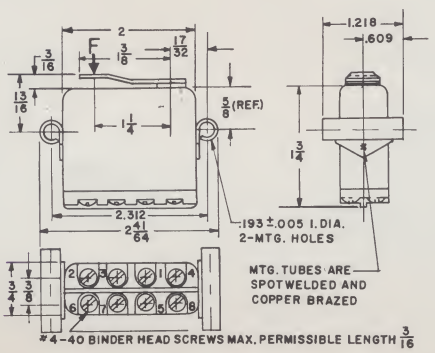
*200,000 with actuator
**Higher temperature model available





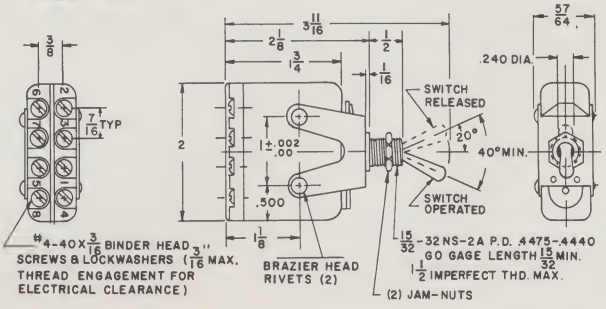
Model J2-9
D.P.D.T. FOUR CIRCUIT

This is the basic Model J2-4 with a pair of mounting tubes spot-welded and copper brazed to the case. The tubes have an I.D. of .193" ±.005. Operating characteristics are the same as for Model J2-4.



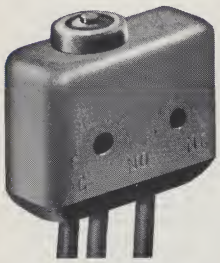
Model A3-17
TOGGLE ACTUATOR

This 2-position toggle is available in N.O. or N.C. maintained position action. The actuator is designed to provide means for mounting the switch in a single panel hole. The actuator is attached to the switch housing with brazier head rivets. This toggle actuator fits a J2 type switch.



ENVIRONMENT-FREE MINIATURE SWITCHES

S.P.D.T.



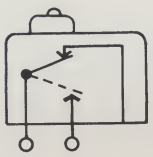
(actual size)

model EF-103

The EF-100 series offers you reliable, protected switching in an unusually small package. The complete snap-action switch mechanism is enclosed in a seamless metal housing measuring only 19/32 x 7/8 x 11/32 thick. The case is treated for corrosion resistance. The unit is sealed with epoxy resin which has a high resistance to moisture vapor penetration. The plunger is corrosion resistant and is sealed by a water tight silicon rubber diaphram. The enclosed basic switch conforms to MIL-S-6743; the entire unit conforms to MIL-E-5272A.

Model EF-103, shown here is the basic unit in the series. Many variations in operating characteristics and termination are also available. For example: High temperature models to 350°F., high inrush currents of 15 amps, models with 5 amp inductive and 10 amp resistive ratings at 30 VDC., MIL-W-5086 wire leads, turret terminals, and many other variations.

EF-101
S.P.N.C.



EF-102
S.P.N.O.

EF-103
S.P.D.T.

OPERATING CHARACTERISTICS FOR BASIC MODEL EF-103

Contact Arrangement	S.P.D.T.
Pretravel	.050 max.
Movement Differential	.004 max.
Overtravel	.003 min.
Operating Force	11 ± 6 oz.
Release Force	4 oz. min.
Contact Pressure	60 grams
Contact Gap	.020 max.
Ambient temperature range	—65° to + 180°F*

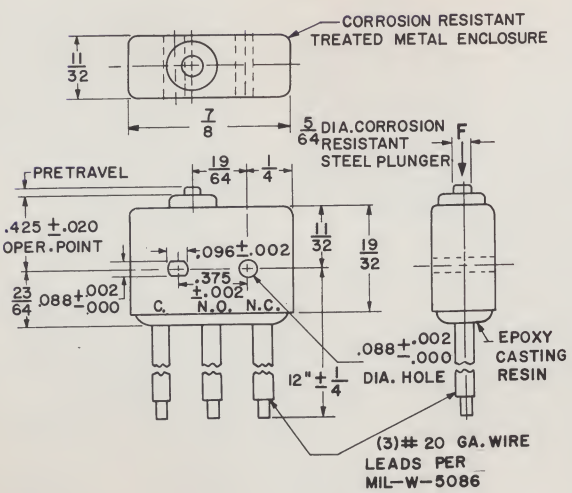
*available also in high tem. material (+350°F)

Electrical Life Rating:

150,000 ops @ 125/250 VAC	2.5 amps
100,000 ops @ 125/250 VAC	5.0 amps
50,000 ops @ 30 VDC	2.5 amps Ind.
50,000 ops @ 30 VDC	4.0 amps Res.

Variations in characteristics available on order.

When ordering, specify circuitry desired.

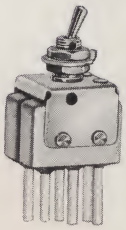


If you do not find the exact characteristics or actuator you need among the few examples shown above and on page 17, we can design and produce a unit to meet your specific requirements.

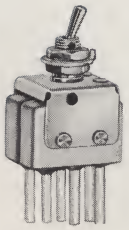
E F ACTUATORS

EXAMPLES

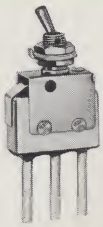
On this page we illustrate a few of the more popular basic actuators for use with Series EF-100 environment-free switches. If you require a different means of actuation for either a single switch, or any number of ganged switches, ask to see other actuator designs currently available. Or a special actuator can be created to meet your application.



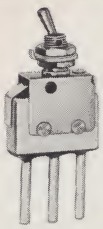
A3-30
MAINTAINED
2 position
DPDT
¼"-40 bushing



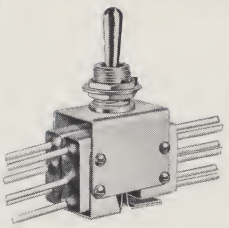
A3-36
MOMENTARY
2 position
DPDT
¼"-40 bushing



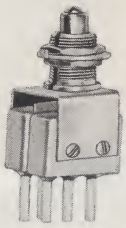
A3-37
MAINTAINED
2 position
SPDT
¼"-40 bushing



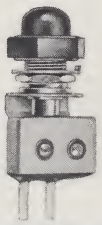
A3-38
MOMENTARY
2 position
SPDT
¼"-40 bushing



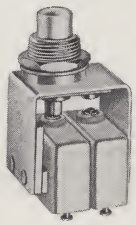
A3-51
MOMENTARY
3 position
(center off)
double pole
15/32" bushing



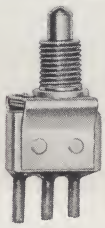
A4-58
DPDT
15/32" bushing
roller ball,
cam actuation



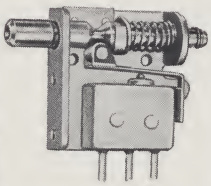
A4-63
SPDT, N.O.
15/32" bushing
rubber hexseal,
Silicone seal for
bushing
protection



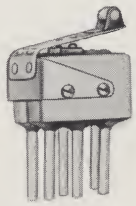
A4-80
DPDT
15/32" bushing
sequential action
turret terminals



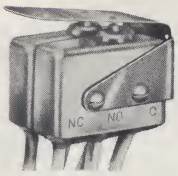
A4-118
SPDT
15/32" bushing
roller ball,
cam actuation



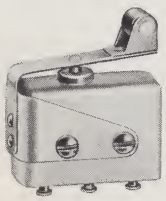
C2-33
INTERLOCK
SPDT, 4-hole mtg.
push momentary
on, automatic
return; pull
maintained on,
remains in
operating
position until
reset by next
push stroke



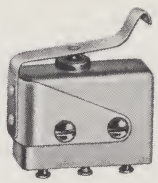
A5-57
DPDT
double pole
roller leaf



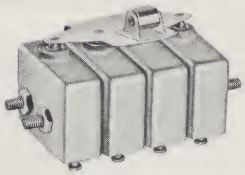
A5-59
DOUBLE POLE
leaf actuator



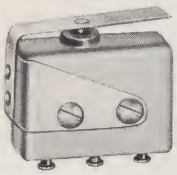
A5-103
SINGLE POLE
roller leaf
actuator



A5-104
SINGLE POLE
curved leaf



A5-105
FOUR POLE
4 SPDT Switches
roller leaf
actuator



A5-106
SINGLE POLE
leaf actuator

CONTROLS COMPANY OF AMERICA
CONTROL SWITCH DIVISION
1420 Delmar Drive • Folcroft, Pennsylvania
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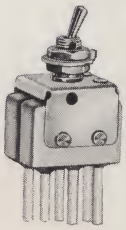
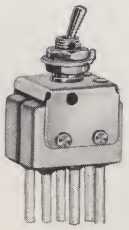
E F ACTUATORS

EXAMPLES

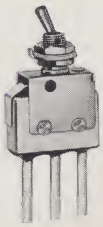
On this page we illustrate a few of the more popular basic actuators for use with Series EF-100 environment-free switches. If you require a different means of actuation for either a single switch, or any number of ganged switches, ask to see other actuator designs currently available. Or a special actuator can be created to meet your application.



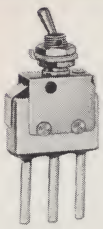
A3-30
MAINTAINED
2 position
DPDT
¼"-40 bushing



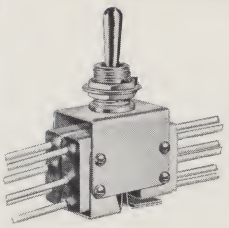
A3-36
MOMENTARY
2 position
DPDT
¼"-40 bushing



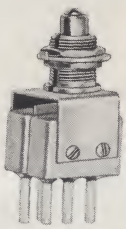
A3-37
MAINTAINED
2 position
SPDT
¼"-40 bushing



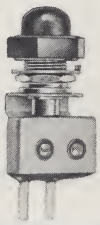
A3-38
MOMENTARY
2 position
SPDT
¼"-40 bushing



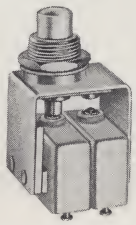
A3-51
MOMENTARY
3 position
(center off)
double pole
15/32" bushing



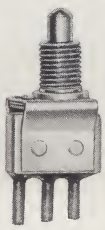
A4-58
DPDT
15/32" bushing
roller ball,
cam actuation



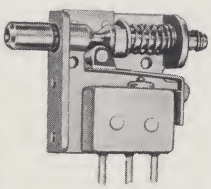
A4-63
SPDT, N.O.
15/32" bushing
rubber hexseal,
Silicone seal for
bushing
protection



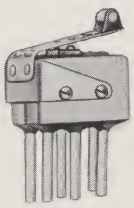
A4-80
DPDT
15/32" bushing
sequential action
turret terminals



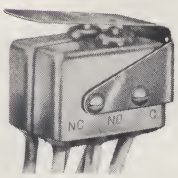
A4-118
SPDT
15/32" bushing
roller ball,
cam actuation



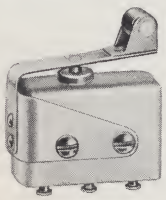
C2-33
INTERLOCK
SPDT, 4-hole mtg.
push momentary
on, automatic
return; pull
maintained on,
remains in
operating
position until
reset by next
push stroke



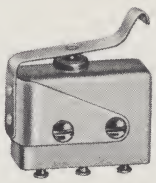
A5-57
DPDT
double pole
roller leaf



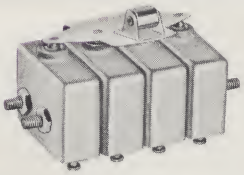
A5-59
DOUBLE POLE
leaf actuator



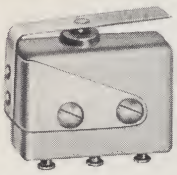
A5-103
SINGLE POLE
roller leaf
actuator



A5-104
SINGLE POLE
curved leaf



A5-105
FOUR POLE
4 SPDT Switches
roller leaf
actuator



A5-106
SINGLE POLE
leaf actuator

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THIS SPACE RESERVED

FOR NEW HERMETIC SWITCHES

TO BE ANNOUNCED SOON

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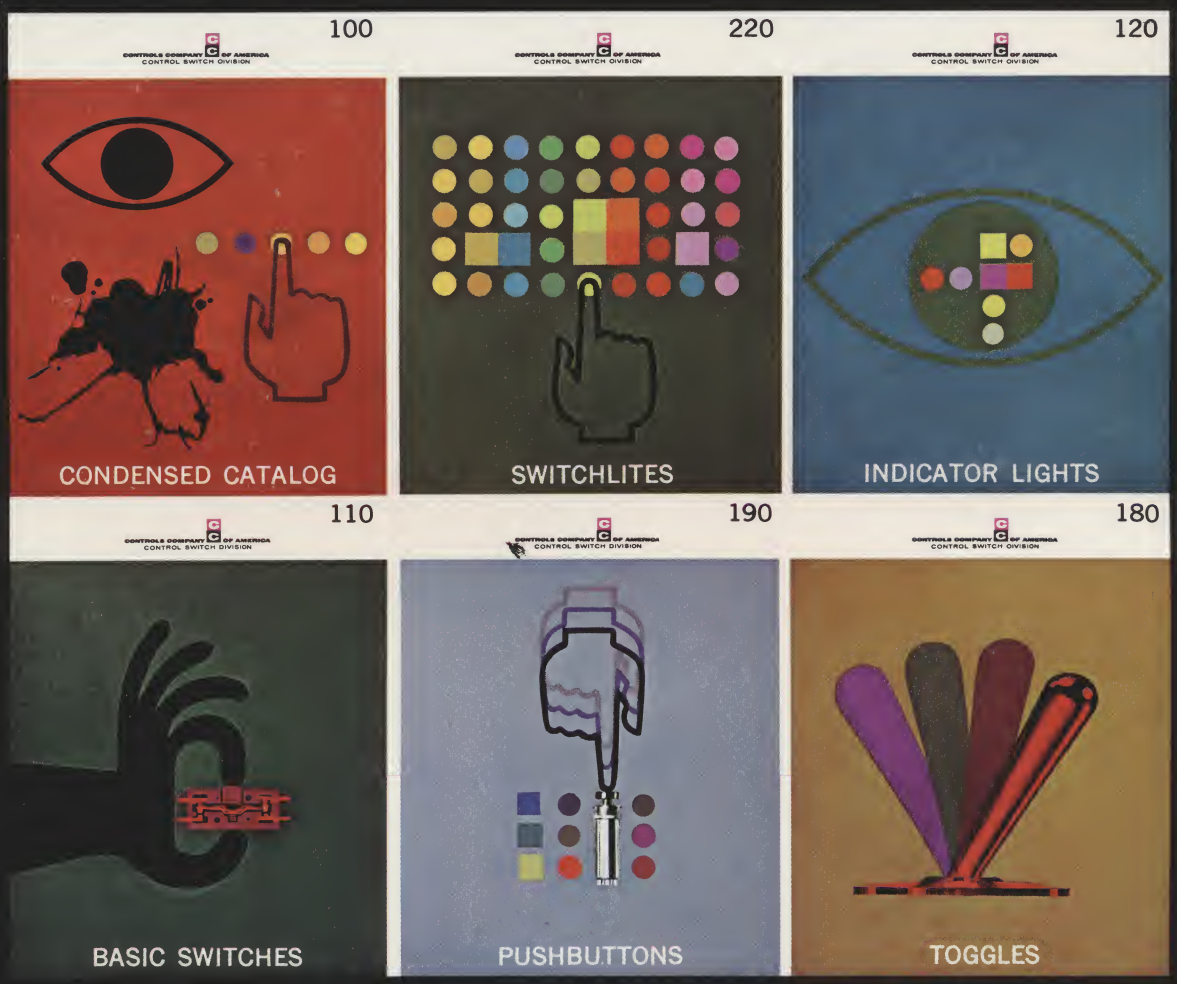

For detailed information on other products, write for any of the catalogs shown above.
Also see our listing in EEM, sec. 3900 & sec. 5100